UNDER SOFTWARE LOCK 07/27/90 09:12:54 U1MAIN

SGAG09 SUBSYSTEM - BURNER FRONT TEMPS

				LEVEL				
	603.F	584.F	596.F		567.F	470.F	519.F	
D	1056.F	1094.F	982.F		979.F	913.F	794.F	E
	808.F	980.F	984.F	4	838.F	1045.F	914.F	
	967.F	680.F	669.F		730.F	758.F	708.F	
	639.F	575.F	593.F		840.F	887.F	717.F	
H	1063.F	1095.F	938.F	3	668.F	1113.F	831.F	A
	897.F	1003.F	962.F		1079.F	1170.F	894.F	
	861.F	731.F	661.F		856.F	804.F	666.F	
	586.F	596.F	630.F		604.F	605.F	567.F	
C	938.F	1053.F	654.F	2	933.F	1029.F	1080.F	F
	938.F	1036.F	1104.F		993.F	941.F	1043.F	
	796.F	659.F	994.F		802.F	656.F	793.F	
	565.F	560.F	625.F		590.F	0.F	578.F	
G	1005.F	993.F	992.F	1	1033.F	1007.F	1096.F	B
	940.F	999.F	1021.F		993.F	1106.F	1132.F	
	1003.F	930.F	658.F		1032.F	909.F	1035.F	
	E	REAR	W		W	FRONT	E	

FORWARD PAGING SGAG09

UNDER SOFTWARE LOCK 07/27/90 09:08:33 U2MAIN

SGAG09 SUBSYSTEM - BURNER FRONT TEMPS

	E	REAR	W	LEVEL	W	FRONT	E	
D	537.F	609.F	551.F	4	536.F	562.F	565.F	E
	1004.F	1102.F	961.F		983.F	1076.F	911.F	
	980.F	993.F	917.F		1044.F	1088.F	-44.F	
	1017.F	1081.F	1044.F		1092.F	1006.F	926.F	
H	589.F	575.F	581.F	3	567.F	579.F	582.F	A
	902.F	1580.F	1066.F		854.F	1032.F	984.F	
	820.F	1141.F	1052.F		926.F	965.F	1071.F	
	918.F	1083.F	1012.F		935.F	850.F	1048.F	
C	555.F	509.F	571.F	2	582.F	559.F	556.F	F
	1020.F	1093.F	926.F		873.F	1008.F	1490.F	
	1027.F	1029.F	876.F		963.F	916.F	1009.F	
	935.F	1081.F	1018.F		993.F	836.F	1344.F	
G	533.F	566.F	549.F	1	1065.F	897.F	1162.F	B
	973.F	1082.F	957.F		1152.F	1207.F	1224.F	
	884.F	986.F	1018.F		1045.F	1176.F	1107.F	
	914.F	1071.F	995.F		821.F	1170.F	856.F	

FORWARD PAGING SGAG09

Overview

The Unit 1 boiler performance tests were conducted from January 26 through February 12, 1987. The purpose of the tests was to verify various boiler performance guarantees, including efficiency, air heater leakage, and fluid-side pressure drops. In addition, boiler-component absorptions and heat transfer coefficients were calculated. The data collected and calculated may also serve as base-line performance data for future reference.

This is a technical report that primarily addresses an evaluation of the functional performance of the unit, including an analysis of the efficiency test results. An overall summary of the guarantees is given below:

EFFICIENCY		%
Measured (Ave 9's Burnertemps)	• Top Level Mill Out	~~88.77~~ 87.77
	• 3rd Level Mill Out	88.20
	• 2nd Level Mill Out	88.49
	• Low Level Mill Out	88.30
Guarantee		88.57
Contributing Factors	• Air Heater Performance[1]	(.36)
	• Economizer Exit Temp	(.18)
	• Low Slagging Coal[2] /Low FEGT High Excess Air (Upper Mills Out)	(.35)
Potential Solutions	• Improve Air Heater Performance (complete punch list & review performance data with APCo)	
	• Reduce Excess Air with Upper Mills Out (see Steam Temp below)	
	• Add Economizer Sootblowers	

(Recurex Recorder)

[1] Prior to the test, Air Preheater Company had advised that their equipment was not ready for testing.

[2] Unit designed to accomodate a range of specified coals (low to high slagging)

Unit Efficiency

A total of six tests were conducted at the guaranteed full load condition of 6,100 Mlbs/hr main steam flow. The test conducted with "A" mill out of service has been divided into two tests (6A and 7A) due to a significant change in primary air damper position in the middle of the four hour test period. The last three tests conducted (10A, 11A, and 12A) showed low values of secondary air heater leakage compared to earlier tests. A review of all the data indicates that the most suspect readings were those obtained at the West side bag house inlet. These 02 readings dropped off significantly compared to earlier tests, while all other grids remained relatively the same. The analyzer and orsat at this location agreed, which leads to the conclusion that the grid must not have been bubbling properly. By making the assumption that the East side bag house 02 reading was representative of the true bag house inlet conditions, the results look much more reasonable. The impact on calculated efficiency is on the order of .1 percent. Table II shows the efficiency for all of the full load tests corrected to contract conditions, and the efficiency for the last three tests making the above assumption.

Uncorrected	88.45	88.49	88.53	88.51	88.59	88.56	88.54
Test No.	4A	5A	6A	7A	10A	11A	12A
Efficiency	88.92	88.87	88.93	88.89	88.98	89.09	89.07
Efficiency (assuming West bag house 02=East)					88.94	89.00	88.98

1350

TABLE II - EFFICIENCY SUMMARY

The guaranteed efficiency of 88.57 percent was exceeded for all test conditions. The average efficiency for all of the tests conducted was 88.93 percent. Appendix B contains a summary of the unit efficiency calculations for all tests conducted. A summary of the total unit output calculations is contained in Appendix C. The calculations for unburned carbon used in the efficiency calculations are shown in Appendix G, with the average fuel analysis listing.

Superheat and Reheat Outlet Temperatures

Tests were conducted with several pulverizer configurations to verify that superheat temperature could be maintained at 1005 degrees F. Tests were also conducted at 75 and 50 percent load to verify that reheat temperature could be maintained at 1005 degrees F over the guaranteed load range. The 50 percent load test was conducted with a main steam flow of 3,100 Mlbs/hr, which was well below the guaranteed flow of 3,965 Mlbs/hr. Table III shows the superheat and reheat temperatures obtained for each test, along with the corresponding spray quantities. The data demonstrates the units' ability to meet the temperature guarantees of 1005 degrees F +/- 10 degrees F for virtually all operating conditions.

flow to the pulverizers, hot and cold primary air temperatures, and mill inlet temperatures. Using this calculated primary air flow and the primary air heater gas side data, the gas flow through the primary air heater was calculated by heat balnce. The gas flow entering the secondary air heaters was then calculated by the difference between total gas mass flow leaving the economizer and gas flow entering the primary air heaters.

The secondary air heater leakage was calculated by the difference between total air heater leakage as calculated above and primary air heater leakage as calculated from the primary air heater gas inlet and outlet data and gas mass flow entering the primary air heater from above. Knowing the secondary air heater leakage, gas temperature leaving the primary air heater, average gas temperature leaving all air heaters, and the gas mass flows, it is possible to calculate the average gas temperature leaving the secondary air heaters. A detailed description of this calculation procedure and calculations are contained in Appendix H.

For the efficiency calculations, the total air flow was calculated stoichiometrically assuming a setting infiltration of two (2) percent. Secondary air flow is the difference between total air flow and measured primary air flow entering the pulverizers. The primary/secondary air flow split is needed to determine the average air temperature entering the unit, and is not a critical value.

The temperature measurements at the bag house inlet were erratic throughout the test period due to static electricity generated by the flue gas. This only occurred at the bag house inlet because the thermocouples installed were not sheathed, and were therefore not grounded. In order to obtain good data, a routine was developed to check each individual thermocouple and eliminate those values which were considered unacceptable. A listing of each bag house inlet thermocouple, for all tests conducted, is contained in Appendix I. Points that are marked with an asterisk, or that have a value of zero, were eliminated from the bag house inlet temperature averages.

TEST RESULTS

The results of the tests will be discussed in the order they appear in the overview. Appendix A contains a listing of all test data obtained during the test period. The nine tests conducted were numbered in the following manner:

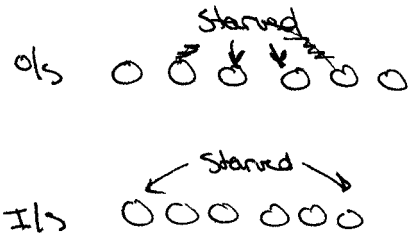
TEST No.	DESCRIPTION
4A	Full load - top rear mill out of service (D mill)
5A	Full load - top front mill out of service (E mill)
6A	Full load - 3rd row front mill out of service (A mill)
7A	Full load - A mill off after PA damper position change
8A	75 % load - 4,400 Mlbs/hr steam flow (mills A,B,H off)
9A	50 % load - 3,100 Mlbs/hr steam flow (mills A,B,C,H off)
10A	Full load - 2nd row front mill out of service (F mill)
11A	Full load - lower rear mill out of service (G mill)
12A	Full load - 3rd row rear mill out of service (H mill)

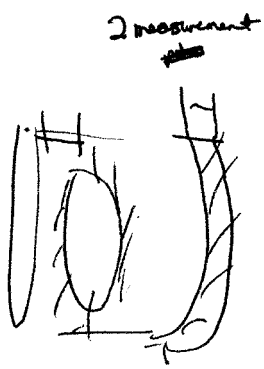
Burners

Balancing - Cold Airflow testing

O/S balance cooling air to all 6 around burner?
↑WB press (↓)

I/S balance cooling air to all 6
↑WB press





outer air vel
inner air

determine areas

pitot tube
or
hot wire anemometer

sec air damper position [sec airflow]
WB PCSS

Outer air position (throttle cut blade position)
spin/backplate position

Burner Line Fires

Clean Air Flow Tests
check burner line to burner line balancing
(relative measure)

PA Flow Calibration

check min flow (minimum velocity requirements)

Raise minimum (startup air flow) 40% ?
on burners which had burner life fires

G | A | E | F

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